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ABSTRACT

An investigation was made of the ways in which good readers (scoring at or above grade level on word attack and comprehension), difference-poor readers (scoring at or above grade level on word attack but below grade level on comprehension), and deficit-poor readers (scoring below grade level on word attack and comprehension) differ in their use of imagery while reading. The subjects, 30 fourth-grade students from each category, each read one passage at the third-grade level and one at the fourth grade level; they were instructed to stop at the end of each sentence, tell whether the sentence had caused a picture to form in their mind and, if so, to describe the picture. Subjects' responses were analyzed in terms of the number of images reported for each passage and the text dependency and completeness of the images. Analysis of the responses revealed significant differences between good readers and both difference-poor and deficit-poor readers in number of images reported and text dependency of images; these differences favored the good readers. Differences between the difference-poor and deficit-poor readers were not significant for any of the variables, and there were no significant differences among the reader groups in completeness of images. (Author/GW)

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Technical Report No. 455

AN INVESTIGATION OF THE IMAGING BEHAVIORS OF GOOD AND POOR FOURTH GRADE READERS WITH EASY AND DIFFICULT TEXT

by

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Report from the Project on
Studies in Reading, Language, and Communication

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ABSTRACT

This study investigated the ways in which good readers, difference-poor readers, and deficit-poor readers at the fourth grade level differ in their use of imagery while reading. Thirty good readers, thirty difference-poor readers, and thirty deficit-poor readers were selected on the basis of Stanford Diagnostic Reading Test scores from a total of 236 fourth grade students who formed the subject pool. There were equal numbers of boys and girls in each reader group, and the subjects were matched on SES using parental occupation as an index of SES.

These 90 subjects performed the following task: Each subject read two passages, one at the third grade level and one at the fourth grade level. The subjects were instructed to stop at the end of each sentence. If the sentence gave them a picture in their mind, they were asked to describe it. If the sentence did not give them a picture, they were instructed to say "no" and to continue reading. Each subject also answered five comprehension questions about each of the two passages. The subjects' responses were then analyzed in terms of three variables: (1) number of images reported for each passage, (2) text dependency of the images reported, and (3) completeness of the images reported. The results of this analysis showed that there were significant differences between good readers and difference-poor readers, and between good readers and deficit-poor readers for number of images reported and for the text dependency

of the images reported. These differences were in favor of the good readers. The differences between difference-poor and deficit-poor readers were not significant for any of the variables, and there were no significant differences among any of the reader groups for completeness of the images reported.

CHAPTER I

Purpose and Rationale

The purpose of this study was to investigate how good readers, difference-poor readers and deficit-poor readers at the fourth grade level differ in the way they use imagery. Difference-poor readers are defined as poor readers who have good word attack skills, but poor comprehension skills; and deficit-poor readers are defined as poor readers who have poor word attack skills and poor comprehension skills (Wiener & Cromer, 1967). This study was designed to provide direct support for the assumption that good readers use imagery and use it effectively while poor readers either do not use it or use it ineffectively.

Rationale for the Problem

Two areas of research literature provide the rationale for this study. The first area is research that concerns imaging as a general learning strategy. The research in this area demonstrates that individuals use mental images as they think, remember and learn and it provides the background for making the assumption that imaging while reading is an effective learning strategy. The second area is research that investigates the relationship between imaging and reading comprehension. The studies in this area show the need for this study and provide the basis for the research questions.

Imaging--A General Learning Strategy. Pavio (1974) describes a dual coding theory of knowledge. Based on his own research, Pavio, (1974) suggests that "verbal and nonverbal information are represented and processed in distinct but interconnected symbolic systems." He refers to the system that is specialized for processing nonverbal information as the "imagery system" and to the other that is specialized for dealing with linguistic units and generating speech as the verbal system. According to Pavio (1974) both systems "are capable of functioning in dynamic and flexible ways to reorganize, manipulate, or transform cognitive information." But Pavio's main point is that not only do these systems perform these functions independently, but they also perform them in an interconnected fashion:

> The reciprocal assumption that the two systems are interconnected is necessary to capture the idea that nonverbal information can be transformed into verbal, or vice versa. Thus objects can be named, names can arouse images, or such exchanges can occur between images and words entirely at an implicit level without being expressed in overt responses . . .
>
> None of this implies a one-to-one relationship between verbal representations and particular images even in the case of the most concrete and specific items. Instead I assume that a word or a phrase can arouse different images, or an object or event different verbal descriptions, depending on one's past experience and the context in which the referential reactions occur.
>
> (Pavio, 1974, p. 8)

Pavio based dual-coding theory on a series of experiments which investigated whether or not individuals used a visual memory

system to make conceptual judgments. Pavio asked his subjects to indicate which animal or object in a pair was the larger under two presentation conditions. Under the first condition the pairs were presented as line drawings. Some of these picture pairs depicted a congruent size relationship, a zebra was shown as larger than a lamp. In other pairs the size relationship was incongruent, a zebra was shown as smaller than a lamp. Under the second condition the pairs were presented in word form. The word-pairs appeared with one word in small print and the other in large print. As in the picture condition, the relationship between the print size of the word pairs and the actual size of the animal or object was sometimes congruent and sometimes incongruent.

Pavio hypothesized that if people do use a visual memory system to make conceptual judgments, pictures would have a more direct access to this system than words. This hypothesis was supported. The subjects were able to indicate which animal or object in a pair was the larger significantly faster under the picture condition. Pavio further hypothesized that if people do use a visual memory system, it should take longer to decide which animal or object is the larger when the picture-pair shows an incongruent size relationship because the individual would experience a conflict between the tendency to respond to the perceptual representation and the tendency to respond to the memory representation. However, Pavio hypothesized that this effect should not occur for words or if it did occur it would be much smaller because the words would first have to be decoded before

the images could be aroused. Thus the individual would not experience a conflict between the perceptual representation and the memory representation. Both of these hypotheses were confirmed. The reaction times were slower for the incongruent than for the congruent picture condition, but this difference was not significant for words. Based on these results, Pavio (1974) concluded that individuals can process information in imaginal form. But more importantly he concluded that the picture-word differences provide clear support that dual coding is involved. He states, "The reaction times presumably were slower in the case of words because one must go through the verbal system in order to access the image system." In other words, Pavio is suggesting that when an individual is asked to make a conceptual judgment about concrete objects presented in printed form, the words must first be decoded using a verbal strategy; then the individual compares the images held in memory. This sequence essentially describes how information is coded using two codes, visual and verbal.

This dual coding theory when applied to the reading process suggests that some information is processed solely by the verbal system, but some of the words that are read activate imaginal representations. Whether information is processed in verbal form or in imaginal form would then be dependent upon the concrete and abstract qualities of the words read, the readers' experience with the words and perhaps upon the implicit ability of the reader to use the verbal and imaginal systems separately and in an interconnected fashion.

Katz and Pavio (1975) further explored the roles of imagery in learning. The findings of Katz and Pavio are especially important for the present study because they suggest the instances in which readers might use imaginal and verbal strategies in a combined form. Katz and Pavio first investigated whether or not a concept name such as "a four-footed animal" could be reliably rated along an imagery dimension. Forty-two college students rated the ease with which 27 concept names evoked an image on a seven-point scale. Pearson product moment correlations between the average ratings of two subgroups of 21 subjects were computed. The resultant correlation of .90 ($p < .01$) indicated that concept names could be reliably rated. Based on these findings Katz and Pavio selected the three concept names rated the highest and the three concept names rated the lowest for additional experimental manipulation. Five instances were chosen as an instance of a four-footed animal. These instances were then represented as either simple line drawings or with the labels of these drawings. Next each concept was given a CVC label. For example the concept of a four-footed animal might be labeled HOB. After a trial where each of the five instances of a concept was paired with the concept label, the subjects were tested by asking them to supply the concept CVC label when just a picture or label of the instance alone was presented. Subjects were randomly assigned to either a condition in which they were given explicit instructions to use imaging or a condition in which the instructions were neutral with respect to imagery. Half of the subjects in each condition

performed the paired-associate concept task just described when the instances were presented as simple line drawings whereas the other half performed the task when the instances were represented by the verbal labels of the drawings. Based on Pavio's dual-coding theory (1974) which asserts that concrete events can be coded both as images and as words, but abstract events are more likely to be coded only in verbal form, Katz and Pavio (1975) hypothesized "that concepts rated high in imagery should be more easily attained than concepts rated low on the imagery scale because, in the former case, subjects can make use of both a verbal and an imagery system to solve this problem." Because they assumed that the subjects would be more likely to code instances as images when they were presented pictorial stimuli or given instructions to use imagery than when they were given verbal stimuli or instructions neutral with respect to imagery, they further hypothesized that pictutes and imagery instructions would improve concept learning. All but one part of these hypotheses were supported by the results. Concepts rated easy-to-image were attained after significantly fewer trials than concepts rated difficult-to-image and the learning of the easy-to-image concepts occurred after significantly fewer trials when the subjects were instructed to image than when the instructions were neutral with respect to imagery. The pictorial presentation did not facilitate learning over the verbal presentation.

The finding that the concepts rated easy-to-image were learned more easily supports the part of Pavio's dual coding theory which suggests that certain concepts are processed by both a verbal and an

imagery system. Since these concepts are processed in two ways they are learned more easily. The finding that instructions to image facilitated concept learning is of particular importance for this study. The finding suggests that an imagery strategy would aid readers not only in simple remembering of what they read but also in attaining concepts and in understanding what was read.

Pavio, (1971, 1974) and Katz and Pavio (1975) studied the imaging behavior of adults. Fourth graders were the subjects in this study, therefore, it is important to show that young children also use a visual memory system and also process information using a dual code.

Perlmutter and Myers (1975) tested the recognition memory of 36 four-year-olds under three presentation conditions. Under the first condition (visual-only) the subjects were shown 36 small objects such as a pen or a spoon. The subjects were told to look carefully at the objects as the experimenter put them into a box. Under the second condition (verbal-only) the subjects listened as the experimenter said the names of 36 objects that were in a box. Under the third condition (visual-verbal) the subjects were shown 36 objects and listened to the names of these 36 objects as they were put into a box. After all the subjects were shown or told all the things that were in the box, the experimenter asked them whether or not some other things were like the objects in the box. For example, the subjects were asked if there was something like a car in the box. Though the subjects generally performed at a high level of correct response

under all conditions, they performed significantly better under the visual-only and the combined visual-verbal conditions than they did under the verbal-only condition. Perlmutter and Myers pointed out, however, that the subjects in one out of twelve cases spontaneously said the names of the objects that were presented under the visual-only condition. Therefore there was little distinction between the visual-only and the combined visual-verbal modes of presentation. These results support those reported by Pavio (1974) in several ways. First the results reported by Perlmutter and Myers suggest that four-year-olds do use a visual memory system. Second the finding that there was no significant difference between the visual-only and the combined visual-verbal presentation conditions and the finding that most of the children in the visual-only condition spontaneously labeled a large percentage of the items suggests that four-year-olds process information using a dual code. These results are important for the present study because they clearly indicate that children have the ability to store information in memory in an imaginal form as well as in a verbal form.

Levin, Ghatala, DeRose and Makoid (1977) go a step further than Perlmutter and Myers (1975) by showing that children can be taught to use a memory image as a learning strategy. Levin et al., (1977) showed fifth grade children a 36 pair pictorial list in which one item in each pair was starred. The subjects were told to learn which item in the pair was starred so that they could identify it later. Under the first experimental condition (Image-Trace), subjects were

told to note the correct item during feedback, and then with a picture of it in their mind to turn their head away and to trace the outline of the picture in the air with their finger. Under the second experimental condition (Trace), the subjects were instructed to trace the outline of the correct item during feedback on top of the picture itself. The third experimental condition was the control where no rehearsal strategies were suggested. The finding of the Levin et al., (1977) study was that subjects under the Image-Trace condition performed at a significantly higher level of correct response than subjects under either the Trace or the control conditions. The finding adds support to the finding of Perlmutter and Myers (1975) that young children, in this case fifth graders, can use a visual memory system. The facilitative effect of imagery instructions suggests, as did the finding of Katz and Pavio (1975) that imagery has value as a learning strategy.

Snodgrass and McClure (1975) found that instructions to image improved the recognition of words at a significantly higher level than they did the recognition of pictures. The finding is similar to and supports the finding of Katz and Pavio (1975). A discussion of the Snodgrass and McClure study is included here because it supports these other findings and helps to clarify how individuals use dual coding.

For the purposes of their study, Snodgrass and McClure (1975) represented 80 concepts with either a picture or its corresponding name. After being exposed to each of the 80 pictures accompanied

by the corresponding name, 130 undergraduate college students were given a study session where they were to learn 40 of the 80 concepts. Twenty of these concepts were represented by pictures and 20 by words. Subjects in the verbal instruction group were asked to rehearse verbally the name of each study item. Subjects in the image instruction group were instructed to image the pictorial representation of each study item. After the study session the subjects were tested. They were shown 80 concepts; 40 were the concepts they had studied and 40 were distractor items. The subjects were to distinguish between the concepts they had studied and the distractors. The results of this study (Snodgrass & McClure, 1975) were quite clear-cut. Memory for pictures was unaffected by instructions but memory for words was improved by instructions to image significantly more than by instructions to verbally rehearse. The authors suggested that subjects may dually code simple pictures naturally, regardless of instructions, whereas dual coding of words may occur only under imagery instructions. This finding agrees with the previously described finding (Perlmutter & Myers, 1975) that four-year-olds spontaneously provided a verbal label for visually presented objects.

Pavio (1971, 1974), Katz and Pavio (1975), Perlmutter and Myers (1975) and Level et al., (1977) have shown that children and adults use a visual or imaginal system as they learn. Katz and Pavio (1975), Levin et al., (1977) and Snodgrass and McClure (1975)

have additionally shown that instructions to image can improve learning. Taken together, these studies demonstrate that imaging is a viable general learning strategy.

Imaging--A Reading Comprehension Strategy. Shepard (1978) defends the role of the mental image in human thought against critics who maintain that mental imagery is secondary or even peripheral to verbal thought processes. Shepard (1978), to demonstrate the importance of imagery, cites famous scientists such as Einstein and Faraday, who reported that mental images played a central role in the origin of their creative ideas. Shepard indicates that the value of mental imagery is often doubted because it is difficult to empirically study something so inherent. Shepard stresses that what is needed is information about the "nature of the mental image itself."

The studies of reading and imaging reviewed in this chapter will show that investigators have generally induced (instructed or trained) their subjects to use imagery. The degree to which readers spontaneously use imagery has not been investigated nor has the nature of the images formed while reading been studied. Though the findings of the studies that will be reviewed here show that induced imagery has a tendency to improve reading comprehension, they were not clear-cut. Part of the reason for this could be that it was not known if the subjects in these studies were using an imaging strategy on their own before the induced treatment. For this reason there is a real need to establish how readers spontaneously use imaging while reading.

Anderson and Hidde (1971) constructed thirty simple sentences all following the same The $NOUN_1$ VERB the $NOUN_2$ pattern. They then asked 24 college students to read the sentences. Half of these subjects were asked to form an image of the event described in each sentence and then rate the vividness of that image. The rest of the subjects were instructed to repeat the sentence aloud three times and then rate its pronunciability. A surprise recall test was given after one presentation of the sentences. The test consisted of a mimeographed list of the subject nouns. Following each noun was a blank where the subject was asked to write the rest of the sentence from memory. The subjects in the imagery condition recalled three times as many words as the subjects in the pronunciability condition. The authors argued that the imagery instructions facilitated learning by causing subjects to process the sentences in a meaningful fashion. However, a followup study by Anderson and Kulhavy (1972) showed that high school students instructed to form mental images while reading a passage silently learned no more than those asked to read carefully. An interesting sidelight of the Anderson and Kulhavy study was that on a post-experiment questionnaire, more than half of the control group reported using mental imagery while about one-third of the group instructed to use imagery said they did not. It would appear that the way in which the subjects spontaneously used imagery interfered with the investigators' instructions. Information about how readers normally use imagery could aid in clarifying the effect of instructions to image.

Lesgold, McCormick and Golinkoff (1975) trained 32 third and fourth graders to draw comic strips to illustrate passages they had read. The training lasted several weeks and included practice at drawing the cartoons. On the last day of training the children were told to image their cartoon rather than draw it and to use their image to remember what they had read. After this training the subjects were asked to read a passage and then retell every fact possible from the story without regard to exact wording. The imagery subjects recalled significantly more of the text than the control group.

Pressley (1976) also trained children at the third grade level to use mental imagery in order to improve their memory of material they had read. However, Pressley's training lasted only 20 minutes. The children were simply given practice at forming mental images and they were shown examples of images that effectively represented what had been read. The actual test task required the children to read and learn a 950-word story. The story was constructed by the investigator to represent the type of prose material that third graders encounter in their school work. The story was divided into sections and each section was printed on a separate page. These pages were bound in a booklet and every printed page was followed by a blank page. The imagery group was instructed to read the material on the printed page and then to construct mental pictures of what had been read while looking at the blank page. The control subjects were told to do whatever possible in order to remember what they had read After reading, all subjects answered 24 short-answer questions

about the story. Analysis of the results showed that the imagery subjects answered significantly more short-answer questions correctly than the control subjects. Though the results reported by Lesgold et al., (1975) and Pressley (1976) show that instructions to image improved recall, they should be viewed with caution according to Pressley (1977). In a review of imagery and children's learning Pressley (1977) discussed the Lesgold et al. (1975) and the Pressley (1976) studies. Pressley (1977) said, "There is one disturbing thing about the studies of imagery effects on children's memory for what they read. None of the demonstrated effects was very large." To support this statement he points out that in Lesgold et al. (1975) imagery subjects recalled 44% of the text but controls recalled 31% and in Pressley (1976) imagery accounted for only 6% of the variance. It is possible that some of the subjects in both the Lesgold et al. (1975) and the Pressley (1976) studies were spontaneously using imagery effectively as they read. If this was so the effect of instructions to image would be reduced.

Levin (1973) classified fourth grade students as good readers, difference-poor readers and deficit-poor readers on the basis of standardized test scores. One-third of the subjects from each reading classification were placed in each of three experimental conditions. Subjects in the first experimental group (reading condition) read a 12-sentence story. Subjects in the second group (picture condition) were given a story in pictures (no words). Subjects in the third group (reading with imagery condition) were instructed to read each

sentence and construct images in their heads about the content of the sentence. All subjects then answered questions about the story. The results indicated that the difference-poor readers in the reading with imagery condition answered significantly more questions correctly than the difference-poor readers in the other two conditions. The performance of the good readers was essentially the same in all three experimental conditions and the deficit-poor readers performed better in the picture condition. A possible explanation for these results is that good readers employ imaging spontaneously; therefore, instruction in imaging does not significantly change their performance. Difference-poor readers do not employ imaging spontaneously as they read; therefore, training in imagery does improve their performance. However, before such an explanation can be accepted more information is needed about how good readers, difference-poor readers and deficit-poor readers spontaneously use imagery while reading.

Rationale for the Method

The methodological problem of this study was that it was difficult to investigate a mental process such as mental imagery as it occurs spontaneously without somehow effecting it by the act of investigation. The most logical solution to this problem is to choose a method of investigating that interfers as little as possible with the spontaneous occurrence of the mental process. For this reason, the analysis of verbal protocols was the method selected to study how fourth graders spontaneously use imagery while reading. This method keeps interference to a minimum because the subjects are instructed to

simply verbalize or report what they are thinking. They do not analyze what they are thinking or report the process they are using.

The analysis of verbal protocols is a technique that has been used in the past by cognitive psychologists. Newell and Simon (1972) used the technique to study how people process information in order to solve a problem. For example, Newell and Simon asked subjects to verbalize what they were thinking as they were solving mathematical problems or playing chess. Newell and Simon (1972) state their reason for using protocol analysis as follows:

> We employ little experimental design using control groups of the sort so familiar in psychology. Because of . . . the focus on the individual, and the fact that much goes on within a single problem solving encounter, experiments of the classical sort are only rarely useful. Instead, it becomes essential to get enough data about each individual subject to identify what information he has and how he is processing it . . . Thus the analysis of verbal protocols is a typical technique for verifying the theory (information processing), and in fact has become a hallmark of the information processing approach.
>
> (Newell and Simon, 1972, p. 12)

This study investigated how individuals process verbal information (words on a page) as mental images in their minds. As in the Newell and Simon (1972) studies the focus was on the individual and a quantity of information was needed. Therefore the protocol analysis technique seemed appropriate.

Further support for using this method in this study came from a reading-related investigation done by Olshavsky (1977). Olshavsky adapted Newell and Simon's (1972) protocol analysis technique for reading research. She used the technique to study the strategies

tenth graders use when they read silently. Olshavsky first trained her subjects in the use of the technique and then had each subject read a short story silently. The subject was instructed to stop at the end of each clause, which was marked by a red dot, and talk about the strategy he or she used to understand the material. The subject did this for an entire selection, and his or her verbal responses were taped and later transcribed. These transcriptions were analyzed by Olshavsky and several independent judges for evidence of reader strategies. If a reader used a strategy at least five times it was given a descriptive name such as "use of context to define a word." Nine strategies were identified using this method. To test for statistically significant differences, Olshavsky used the Fisher Exact Probability Test. Her results showed that readers with high interest, readers with abstract style material, and good readers used certain strategies significantly more often than they used others. These results indicate that the analysis of verbal protocols is an effective technique for the study of how readers process information as they read. However, Olshavsky's study was done with tenth graders and concerned strategies used while reading. This study was done with fourth graders and investigated imaging behaviors while reading; therefore, it was necessary to pilot test the protocol analysis technique with fourth graders to determine if it would provide usable information about mental imaging.

Pilot Test

Twelve subjects were selected from a large metropolitan school

system. Based on teacher judgment, four of the subjects were designated as good readers, four as difference-poor readers and four as deficit-poor readers. These subjects were then tested using the protocol analysis technique adapted from Olshavsky (1977); the subjects were told the following:

1. You will be given three short stories to read silently.
2. You should read the story silently but stop reading when you come to a red dot. At the dot, say "yes" if the sentence you just read gives you a clear picture in your mind or say "no" if the sentence you just read gives you no picture or a very unclear picture. If the sentence gives you a picture in your mind, describe the picture as well as you can.
3. You should continue reading and talking this way until you finish the story; read as though you were alone; you will not be interrupted.
4. You will be tape recorded.

Each subject was given a practice session to familiarize him or her with the procedure and the tape recording. After the subjects' oral responses were taped, they were transcribed and matched with the corresponding sentences in the story. The data were then analyzed.

One of the deficit-poor readers showed a high degree of distractability during the pilot testing. Her responses were therefore considered invalid and not included in this analysis.

Table 1 shows the results of a count of the mean number of images formed by each group. The differences in the number of images formed by each group were compared using the Mann-Whitney U test. There were statistically significant differences between the number of images formed by the good readers and the difference-poor readers and between the difference-poor readers and the deficit-poor readers at the .014 level. There were no significant differences in number of images formed between good readers and deficit-poor readers.

TABLE 1

Number of Images Formed by the Three Reader Types (Pilot)

Good Readers		Difference-Poor		Deficit-Poor	
S1	23	S5	12	S 9	18
S2	16	S6	11	S10	13
S3	17	S7	8	S11	20
S4	17	S8	12		
$\bar{X}$ = 18.75		$\bar{X}$ = 10.75		$\bar{X}$ = 17.00	

Following this quantitative analysis, the mental images reported by the eleven subjects were qualitatively analyzed. This qualitative analysis was performed on two variables. The first, text dependency, was selected as a measure of how accurately the images reported, reflected what was stated in the sentence read. The second, completeness, was selected as a measure of the degree to which the reported

images contained the facts and ideas presented in the original sentence.

Text dependency was rated as either high with a (2) or low with a (1). Completeness was rated (3) for complete, (2) for partial information, and (1) for not complete. A second trained judge--a graduate student in curriculum and instruction independently rated the subjects' responses using the same criteria as the investigator had used. Two contingency tables were then prepared to show the inter-judge reliabilities.

Table 2 shows the frequency of agreement/disagreement between the two judges. The intersection of row "1" and column "1" for example is the number of responses judged "one" by both judges. The intersection of row "1" and column "2" is the number of responses judged "two" by the investigator and "one" by judge two. The intersection of row "1" and column "3" is the number of responses judged "three" by judge one and "one" by judge two. The proportion of agreement between the two judges was calculated by adding the numbers in the left to right diagonal and by dividing that sum by the total number of images reported and scored, which was 158. The result of that computation was .91.

Table 3 shows the response judgements for completeness. The proportion of agreement between the two judges on the completeness variable was calculated in the same way as the proportion of agreement for text dependency. The result of this calculation for completeness was .92.

TABLE 2

Frequency of Agreement/Disagreement: Two Judges' Ratings of Text Dependency (Pilot Test)

Score		Judge One (The Investigator)		
		1	2	
Judge Two	1	77	7	84
	2	7	67	74
		84	74	158

TABLE 3

Frequency of Agreement/Disagreement: Two Judges' Ratings of Completeness (Pilot Test)

Score		Judge One (The Investigator)			
		1	2	3	
Judge Two	1	19	3	0	22
	2	0	65	0	65
	3	0	9	62	71
		19	77	62	158

Using the investigator's validated passage dependency and completeness scores, the good, difference-poor, and deficit-poor readers were compared using the Kruskal-Wallis one-way analysis of variance. Since each subject read three passages, one at the third grade level, one at the fourth grade level, and one at the fifth grade level, the three groups were compared on the scores for each level of difficulty and on the combined scores for the three passages. The results revealed no significant differences among groups at any of the levels of material, and no significant differences among groups for the combined scores.

The difficulty level of the material in the pilot ranged from grade three to grade five. However, all subjects even the poor readers, read the material at all three levels. The Kruskal-Wallis one-way analysis of variance showed no significant differences within groups for number of images formed, for passage dependency, or for completeness as the difficulty level of the material increased.

Discussion of Pilot Test Results. The primary purpose of the pilot test was to develop a means of gathering and analyzing quantitative and qualitative data on the imaging behavior of good, difference-poor and deficit-poor readers. The pilot test showed that the protocol analysis technique can be used with fourth graders. Good, difference-poor, and deficit-poor fourth grade readers understood the procedure and were able to respond appropriately. The comparison of the passage dependency and the completeness scores of the investigator and a trained judge showed that the transcribed responses of the fourth grade subjects can be evaluated with a high degree of consistency. Based on these pilot test findings, it was decided that

the protocol analysis technique would be used to gather the data for this study. The specific findings of the pilot tests were inconclusive in themselves because of the small number of subjects and because no standardized measure was used to determine the reading levels of the subjects.

Definition of Terms

The key terms that are used throughout the discussion of this study are summarized and defined in the following list.

Completeness: A measure of the degree to which the images reported after reading a sentence contain the facts and ideas presented in the sentence.

Deficit-Poor Readers: Readers who score below grade level on both the word attack and the comprehension subtests of the Stanford Diagnostic Reading Test.

Dual-Coding Theory: The theory developed by Pavio (1974) which suggests that "verbal and non-verbal information are represented and processed in distinct but interconnected symbolic systems."

Good Readers: Readers who score at or above grade level on both the word attack and the comprehension subtests of the Stanford Diagnostic Reading Test.

Imaging: The formation of mental pictures as a way of processing information.

Protocol Analysis: The protocol analysis for this study consisted of counting the number of images reported for each sentence

and scoring the text dependency and the completeness of the reported images.

Text Dependency: A measure of how accurately the images reported after reading a sentence reflect what was stated in the sentence.

Specific Purpose for the Study

Based on the relevant research literature and the results of the pilot test, the specific purpose of the study can be stated: The purpose of the study was to investigate how good readers, difference-poor readers and deficit-poor readers differ in the number of images they report, the text dependency of the images they report and the completeness of the images they report when reading both easy and difficult text. The following research questions were developed to investigate this problem.

Research Questions. The major question posed for this study was, How do good readers, difference-poor readers and deficit-poor readers differ in the way they use imagery while reading? In order to specifically answer this question four subquestions were developed as follows:

> Will the difficulty level of the material effect the way good readers, difference-poor readers, and deficit-poor readers use imagery?
>
> Will the number of images reported be different for good readers, difference-poor readers and deficit-poor readers?

Will the text dependency of the images reported be different for good readers, difference-poor readers and deficit-poor readers?

Will the completeness of the images reported be different for good readers, difference-poor readers and deficit-poor readers?

Research Hypotheses. Based on these questions nine non-directional hypotheses were generated and stated in the null form. There was not enough available evidence to support directional predictions.

Hypothesis One: There will be no significant difference between the number of images reported by the good fourth grade readers and the number of images reported by the difference-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Two: There will be no significant difference between the number of images reported by the good fourth grade readers and the number of images reported by the deficit-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Three: There will be no significant difference between the number of images reported by the difference-poor fourth grade readers and the number of images reported by the deficit-poor fourth grade

readers on both the easy and on the difficult text.

Hypothesis Four: There will be no significant difference between the text dependency scores of the good fourth grade readers and the text dependency scores of the difference-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Five: There will be no significant difference between the text dependency scores of the good fourth grade readers and the text dependency scores of the deficit-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Six: There will be no significant difference between the text dependency scores of the difference-poor fourth grade readers and the text dependency scores of the deficit-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Seven: There will be no significant difference between the completeness scores of the good fourth grade readers and the completeness scores of the difference-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Eight: There will be no significant difference between the completness scores of the good fourth

grade readers and the completeness scores of the deficit-poor fourth grade readers on both the easy and on the difficult text.

Hypothesis Nine: There will be no significant difference between the completeness scores of the difference-poor fourth grade readers and the completeness scores of the deficit-poor fourth grade readers on both the easy and on the difficult text.

CHAPTER II

Method

The procedures used in this study were based on the pilot test described in Chapter I and relevant research literature.

Experimental Design

The design for this study was a 2 x 3 factorial with three dependent variables. The analysis was done on the simple effects. There were two levels of material (easy and difficult) and three reader types (good, difference-poor-and deficit-poor). The three dependent variables were number of mental images reported, text dependency scores of the mental images reported and completeness scores of the mental images reported.

Subjects

The subjects selected for this study came from three semi-rural school systems in southern Wisconsin. Each system had approximately 2000-3000 students. Two fourth grade classes participated from one system, three classes participated from the second and seven participated from the third.

The phonetic analysis, the structural analysis, and the comprehension subtests of the Stanford Diagnostic Reading Test, Green Level (1976) were administered to these twelve classes by the investigator. Because the test was given in the seventh month of the fourth grade, grade level was set at 4.7. The phonetic analysis and the structural

analysis subtest scores were averaged to form a combined word attack score. Subjects who scored at or above grade level on word attack and comprehension were designated as good readers. Subjects who scored at or above grade level on the word attack but below grade level on comprehension were designated as difference-poor readers. Subjects who scored below grade level on the word attack and the comprehension were designated as deficit-poor readers. Table 4 shows the number of subjects by sex in each reader group.

TABLE 4

Number of Male and Female Good, Difference-Poor and Deficit-Poor Readers

	Good	Difference-Poor	Deficit-Poor	
Boys	72	22	29	125
Girls	80	16	15	111
				236

Since the purpose of this study was to investigate imaginal differences between good and poor readers using easy and difficult material, it was important to minimize differences due to another factor such as past experience. Because there might well be greater variation in the past experience of children from different socio-economic groups than there would be in the experiences of children from a similar SES group, all subjects selected from the subject pool were matched on SES. Baker (1957) states, "the single item most

commonly used for social class indices is occupational position." Baker indicates that there are several reasons for this; the first is that a job represents a "relatively full-time functionally significant social role" and second it is easy to determine a person's job. Therefore the occupations of the parents of each of the subjects in the subject pool were used as a determiner of each subject's SES. Parental occupation for each subject was obtained from school files.

The Center's Occupational Index described by Baker (1957) was selected to categorize the occupations of the subjects' parents. The Center's Index has nine categories and includes specific descriptions of the types of occupations included in each category. The nine categories are as follows:

1. Large business (owners and managers)
2. Professional (doctors, lawyers, teachers, engineers, etc.)
3. Small business
4. White-collar workers
5. Farm owners and managers
6. Skilled workers and foremen
7. Farm tenants
8. Semi-skilled workers
9. Unskilled workers and farm laborers

With few exceptions the parental occupations of the difference-poor and deficit-poor readers were at or below number 4 on the Center's Index. Of these subjects, 2 male difference-poor readers, 1 male deficit-poor reader, and 1 female deficit-poor reader were

eliminated from the subject pool. One difference-poor female subject whose parents' occupations were categorized under "2" on the Center's Index was retained in order to have 15 females in each reader group. Next, using a table of random numbers, 15 male difference-poor readers and 15 male deficit-poor readers were selected from the pool of male difference and deficit-poor readers. Since there were only 15 females in both the difference and deficit poor reader groups no random selection was possible. The final step in the subject selection process consisted of randomly selecting 15 male and 15 female good readers whose parents' occupations were at or below "4" on the Center's Occupational Index. In all, 90 subjects were selected. There were 30 subjects in each of the three reader groups with equal numbers of boys and girls in each group.

Materials

Each subject was asked to silently read two passages, each fifteen sentences in length. One of the passages was at the third grade level of difficulty and the other was at the fourth grade level of difficulty. Since one focus of the study was on how fourth grade readers typically image while reading, material was selected from the Scott Foresman Reading System (Aaron et al., 1971) in order to reflect a typical classroom reading task.* Five multiple choice comprehension questions were developed for each passage.** These questions were of the literal recall type and emphasized both content and sequence. Two

*See Appendix A for these passages.
**See Appendix B for these questions.

graduate students in curriculum and instruction reviewed the passages and the comprehension questions and agreed that the questions did validly test the content of the passages.

Procedure

Each subject performed the task on an individual basis. The subjects were tested outside the classroom in a quiet corner of the instructional media center in their school. The investigator first asked each subject:

> "Do you know what I mean when I ask, do you have pictures in your mind?"

With few exceptions, the subjects responded immediately, indicating they did know what was meant. The few who said they did not know were asked if they ever imagined things or if they could close their eyes and still see the room they were in. In all cases several sentences using different terminology served to clarify to the subjects what was meant by "pictures in your mind."

The subjects were then told the following by the investigator:

> "I am trying to find out if kids have pictures in their minds when they read. There are no right or wrong answers for what I will be asking you. I would like you to tell me as well as you can what is really happening in your mind when you read. Do you understand?"

The subjects usually indicated that they did. They were then shown the practice exercise and were told by the investigator:

"I would like you to read this passage silently (or to yourself). When you come to the red dot that is at the end of each sentence, I would like you to stop. If the sentence you just read gives you a picture in your mind, I would like you to talk about or describe the picture. If it does not give you a picture say 'no' and go right on reading until you get to the next red dot and then stop and do the same thing. Go right on reading and talking like this for the rest of the passage."

Many of the subjects understood these directions immediately and performed the practice exercise with little or no prompting. Some subjects paused for more than a second or so after reading a sentence. When asked what they were doing, they usually responded with a statement indicating that they were looking for or trying to form a picture in their mind. These subjects were instructed not to try to make a picture come, but to read the sentence and if a picture came to their mind immediately to talk about it, if it did not come to their mind say "no" and go right on reading. Several other subjects appeared to be repeating verbatim what they had read. These subjects were asked if they were really talking about pictures they had in their mind. These subjects indicated that they thought they had to say something at the end of each sentence. In these cases the directions were repeated again stressing that it was neither right nor wrong to have or not to have a mental picture.

After the practice session and after the subjects indicated that

they understood the procedure, each subject was told the following by the investigator:

> "I would like you to do again exactly what you did in the practice session. Read each sentence silently. When you get to the red dot stop and if the sentence you just read gives you a picture in your mind talk about it or describe the picture. If the sentence did not give you a picture in your mind say 'no' and go right on reading. Do this for the entire passage. I will not stop you or interrupt you. You will be tape recorded."

The tape recorder was there but not running during the practice session. Being told that they would be tape recorded seemed to have little effect on the subjects. Several asked who would listen to them. When told that only the investigator would, they proceeded with the task without further comment. After each subject had completed the first passage in the manner just described, he or she was asked to answer the comprehension questions for that passage. The subjects read each question silently and then circled the one statement in four that was the best answer to that question. The subjects were not allowed to look back at the passage while answering the questions nor were they allowed to go back and change an answer. This procedure was followed in exactly the same manner for the second passage.

CHAPTER III

Results

The verbal protocols collected from the 30 good, 30 difference-poor and 30 deficit-poor readers were transcribed from the tape so that each self-report image appeared beneath the corresponding sentence. An identification number was assigned to each subject's responses to aid objectivity during scoring. The investigator did not know if the responses were the verbal protocols of a good reader, a difference-poor reader or a deficit-poor reader. These verbal protocols were analyzed both quantitatively and qualitatively. The results of protocol analysis were then statistically analyzed.

Analysis of Verbal Protocols

The quantitative analysis of the images reported by the 90 subjects was done by taking a count of the number of images reported by each subject for each of the two passages.

The qualitative analysis of the images reported was done on two variables: (1) text dependency (to what degree does the reported image relate to the sentence read?) and (2) completeness (to what degree does the reported image contain the facts and ideas presented in the sentence read?). Text dependency had been rated as either high or low on the pilot test. However, a review of the pilot test results showed that some responses could not be accurately scored using a two-point scale. For this reason, a scale of three was used to rate

text dependency for the present study. A self-reported image with a high degree of text dependency was rated (3), a self-reported image that was partly text dependent was rated (2) and a self-reported image with a low degree of text dependency was rated (1). The completeness rating used for the present study was the same as the one used for the pilot test. A self-reported image that was complete was rated (3), and a self-reported image that contained partial information was rated (2), and a self-reported image that was not complete or contained little of the information presented in the sentence read was rated (1).

Interjudge Reliability. After the investigator rated each subject's responses, a second trained judge independently rated the subjects' responses using the same criteria the investigator had used. Table 5 shows the frequency of agreement/disagreement between two judges. The intersection of row "1" and column "1" for example is the number of responses judged "one" by both judges. The intersection of row "1" and column "2" is the number of responses judged "two" by the investigator and "one" by judge two. The intersection of row "1" and the column "3" is the number of responses judged "three" by judge one and "one" by judge two. The proportion of agreement between the two judges was calculated by adding the numbers in the left to right diagonal and by dividing the sum by the total number of images reported and scored, which was 1369. The result of that computation was .79.

TABLE 5

Frequency of Agreement/Disagreement: Two Judges' Ratings of Text Dependency

Score		Judge One (The Investigator)			
		1	2	3	
JUDGE TWO	1	247	61	13	321
	2	37	281	126	444
	3	1	49	554	604
		285	391	693	1369

Table 6 shows the response judgements for completeness. The proportion of agreement between the two judges on the completeness variable was calculated in the same way as the proportion of agreement for text dependency. The result of this calculation for completeness was .78. The responses from two subjects and the scoring of those responses by the two judges are presented in Appendix C as an example of the scoring procedure.

TABLE 6

Frequency of Agreement/Disagreement: Two Judges' Ratings of Completeness

Score		Judge One (The Investigator)			
		1	2	3	
Judge Two	1	410	139	15	564
	2	32	342	81	455
	3	2	32	316	350
		444	513	412	1369

The results of the quantitative analysis of the images reported by the 90 subjects (the number of images reported for each passage by each subject) and the results of the qualitative analysis (the investigator's text dependency and completeness scores) were then analyzed by performing eighteen planned comparisons. Planned comparisons rather than an omnibus F test were used because specific experimental questions were developed before the data were collected. Table 7 shows each of the planned comparisons that were made and the corresponding hypotheses.

Analysis

The mean number of images reported by each reader group for the easy and for the difficult text was first computed. Because there

TABLE 7

Hypotheses and Corresponding Planned Comparisons

	Good versus Difference-Poor		Good versus Deficit-Poor		Difference-Poor versus Deficit-Poor	
Number of Images Easy Text	$\hat{\psi}_1$	Hypothesis One	$\hat{\psi}_3$	Hypothesis Two	$\hat{\psi}_5$	Hypothesis Three
Number of Images Difficult Text	$\hat{\psi}_2$		$\hat{\psi}_4$		$\hat{\psi}_6$	
Text Dependency Easy Text	$\hat{\psi}_7$	Hypothesis Four	$\hat{\psi}_9$	Hypothesis Five	$\hat{\psi}_{11}$	Hypothesis Six
Text Dependency Difficulty Text	$\hat{\psi}_8$		$\hat{\psi}_{10}$		$\hat{\psi}_{12}$	
Completeness Easy Text	$\hat{\psi}_{13}$	Hypothesis Seven	$\hat{\psi}_{15}$	Hypothesis Eight	$\hat{\psi}_{17}$	Hypothesis Nine
Completeness Difficulty Text	$\hat{\psi}_{14}$		$\hat{\psi}_{16}$		$\hat{\psi}_{18}$	

were 15 sentences in each passage the total number of self-reported images possible was 15 per passage.

The mean text dependency score and the mean completeness score for each subject was computed by totaling the investigator's text dependency and completeness scores for each of the two passages and dividing that total by the number of images the subject reported on each passage. The maximum possible score for both variables was 3. Using these mean scores from each subject, a mean text dependency score and a mean completeness score for each reader group was computed by totaling the mean subjects in that group. Table 8 shows the mean number of images reported by each reader group, the mean text dependency score and the completeness score of these reported images.

Sample comparison values were then computed by subtracting one mean from another for the comparison of interest. Table 9 shows these comparison values which are grouped by family. Each family consists of comparisons between good, difference-poor and deficit-poor readers for one dependent variable for one level of material.

Dunn's Multiple Comparison Procedure (Kirk, 1968) was used to test for significant differences between means. This procedure results in a value for the difference (d) that a particular comparison in a family must exceed in order to be declared significant. Dunn's Multiple Comparison Procedure insures that the experiment-wise or in the case of the present study the family-wise error rate will be kept at a reasonable level by splitting up the level of significance (α) among a set of planned comparisons. The family-wise error rate for the present study was set at $p < .05$. There were 3 comparisons per family

TABLE 8

Mean Scores and Standard Deviations for Three Readers Groups for Number of Images Reported and Text Dependency and Completeness Scores

		Good Readers	Difference-Poor Readers	Deficit-Poor Readers
Number of Images Easy Text	$\bar{X}$	9.900	6.633	6.333
	SD	3.845	3.873	3.933
Number of Images Difficult Text	$\bar{X}$	9.767	7.067	6.267
	SD	4.500	4.234	3.939
Text Dependency Easy Text	$\bar{X}$	2.454	2.013	1.927
	SD	.4323	.7342	.8343
Text Dependency Difficult Text	$\bar{X}$	2.450	1.918	1.902
	SD	.4610	.7307	.8824
Completeness Easy Text	$\bar{X}$	2.005	1.826	1.679
	SD	.4934	.6214	.7760
Completness Difficult Text	$\bar{X}$	1.900	1.664	1.563
	SD	.5186	.6399	.7750

TABLE 9

Summary Table: Differences Between Means, the Mean Square Errors and (d) Values Needed for Significance

Family of Comparisons	MSE	(d) Value	Good versus Difference-Poor	Good versus Deficit-Poor	Difference-Poor versus Deficit-Poor
Number of Images Easy Text	15.084	2.470** 3.060*	3.267*	3.567*	.300
Number of Images Difficult Text	17.898	2.682** 3.328*	2.700**	3.500*	.800
Text Dependency Easy Text	.474	.439**	.441**	.527**	.086
Text Dependency Difficult Text	.508	.454**	.532**	.547**	.015
Completeness Easy Text	.411	.409**	.218	.261	.043
Completeness Difficult Text	.426	.417**	.258	.294	.040

* $p < .01$
** $p < .05$

which resulted in $p < .0167$ per comparison. In addition to showing the sample comparison values, Table 9 shows the mean square error for each group of comparisons and the (d) or difference value each comparison in a family must exceed in order to be declared significant.

Comparisons One and Two were significant at the $p < .01$ level. Therefore there is sufficient evidence to reject Hypothesis One: There is no significant difference between the number of images reported by the good readers and the number of images reported by the difference-poor readers on either the easy or on the difficult text. Though Hypothesis One was non-directional, inspection of Table 8 shows that the mean score of the good readers was higher than the mean score of the difference-poor readers. This indicates that the good readers reported more images than the difference-poor readers on both the easy and on the difficult text.

Comparisons Three and Four were also significant at the $p < .01$ level. There is sufficient evidence to reject Hypothesis Two: There is no significant difference between the number of images reported by the good readers and the number of images reported by the deficit-poor readers on either the easy or on the difficult text. Though Hypothesis Two was also non-directional, inspection of Table 8 shows that the mean score of the good readers was higher than the mean score of the deficit-poor readers. This indicates that the good fourth grade readers reported more images than the deficit-poor fourth grade readers on the easy and on the difficult text.

Comparisons Five and Six were not significant. Therefore Hypothesis three is accepted. There is no significant difference between the number of images reported by the difference-poor fourth grade readers and the number of images reported by the deficit-poor fourth grade readers on either the easy or on the difficult text.

Comparisons Seven and Eight were significant at the $p < .05$ level. Therefore there is sufficient evidence to reject Hypothesis Four: There is no significant difference between the text dependency scores of the good fourth grade readers and the text dependency scores of the difference-poor fourth grade readers on either the easy or on the difficult text. Though Hypothesis Four was non-directional, inspection of Table 8 shows that the mean score of the good readers was higher than the mean score of the difference-poor readers. This indicates that the good readers had higher text dependency scores than the difference-poor readers on both the easy and on the difficult text.

Comparisons Nine and Ten were significant at the $p < .05$ level. Therefore there is sufficient evidence to reject Hypothesis Five: There is no significant difference between the text dependency scores of the good fourth grade readers and the text dependency scores of the deficit-poor fourth grade readers on either the easy and or the difficult text. Though Hypothesis Five was non-directional, inspection of Table 8 shows that the mean score of the good readers was higher than the mean score of the deficit-poor readers.

This indicates that the good readers had higher text dependency scores than the deficit-poor readers on both the easy and on the difficult text.

Comparisons Eleven and Twelve were not significant. Therefore Hypothesis Six is accepted. There is no significant difference between the text dependency scores of the difference-poor fourth grade readers and the text dependency scores of the deficit-poor fourth grade readers on either the easy or on the difficult text.

Comparisons Thirteen and Fourteen were not significant. Therefore Hypothesis Seven is accepted. There is no significant difference between the completeness scores of the good fourth grade readers and the completeness scores of the difference-poor fourth grade readers on either the easy or on the difficult text.

Comparisons Fifteen and Sixteen were not significant. Therefore Hypothesis Eight is accepted. There is no significant difference between the completeness scores of the good fourth grade readers and the completeness scores of the deficit-poor fourth grade readers on either the easy or on the difficult text.

Comparisons Seventeen and Eighteen were not significant. Therefore Hypothesis Nine is accepted. There is no significant difference between the completeness scores of the difference-poor fourth grade readers and the completeness scores of the deficit-poor fourth grade readers on either the easy or on the difficult text.

Supplementary Analysis. Three additional questions were of interest for this study. First, would there be a difference between the performance on the easy text and the performance on the difficult text for each reader group on all three dependent variables? The mean scores on the easy text and the mean scores on the difficult text, presented in Table 8, were compared for each reader group on all three dependent variables using the t-test for matched samples (Hays, 1973). The critical value for t .01/2; 29df = 2.756. Table 10 shows the obtained t-value for each comparison.

TABLE 10

t-Values for Mean Score Comparisons Between Easy and Difficult Text

	Good Readers	Difference-Poor Readers	Deficit-Poor Readers
Number of Images	t = .15	t = 1.142	t = -.17
Text Dependency	t = .008	t = .917	t = .24
Completeness	t = 1.650	t = 2.170	t = 1.444

None of the t-values in Table 10 exceeded the critical value. There were no significant differences between easy and difficult text for any of the three reader groups on any of the three dependent variables.

Second, would there be differences among the three reader groups on the comprehension scores for both the easy and the difficult text? Table 11 shows the mean comprehension scores and the standard deviations of these scores for each of the three reader groups for both the easy and for the difficult text.

TABLE 11

Mean Scores and Standard Deviations for Three Reader Groups for Comprehension Scores on Easy and on Difficult Text

		Good Readers	Difference-Poor Readers	Deficit-Poor Readers
Easy Text	$\overline{X}$	4.900	4.600	4.400
	SD	.3051	.6215	.7240
Difficult Text	$\overline{X}$	4.933	4.533	4.033
	SD	.2537	.7761	1.0662

The difference among the three reader groups on the comprehension scores on the easy and on the difficult text was statistically analyzed using the Scheffe Post Hoc Comparison procedure following an F test which was significant at .0048 for the easy text and at .001 for the difficult text. Table 12 shows the differences between

the means of the comprehension scores for the easy and for the difficult text and indicates which comparisons were significant at the $p < .01$ level.

TABLE 12

Differences Between Mean Comprehension Scores, and the Mean Square Errors Among the Three Reader Groups

Family of Comparisons	MSE	Good versus Difference-Poor	Good versus Deficit-Poor	Difference-Poor versus Deficit-Poor
Comprehension Easy Text	.334	.300	.500*	.200
Comprehension Difficult Text	.601	.400	.900*	.500*

* $p < .01$

Table 12 shows that there were significant differences between the comprehension scores of the good readers and the deficit-poor readers on the easy text. There were also significant differences between the comprehension score of the good readers and the deficit-poor readers and between the difference-poor readers and the deficit-poor readers on the difficult text.

Third, would there be a relationship between imaging behavior on a passage and the comprehension scores on that same passage? Table 13 shows the Pearson Product Moment correlations between the

comprehension scores on each of the two passages and the three dependent variables: number of images reported, text dependency and completeness scores.

TABLE 13

Correlations Between Comprehension and the Three Dependent Variables for the Three Reader Groups

N = 90	Number of Images	Text Dependency	Completeness
Easy Text	.246	.102	-.009
Difficult Text	.203	.172	.062

In order to determine their significance, these correlations were transformed to Z-scores. The significance of these Z-scores was then determined by reference to the Z-Table.

Only the correlation of .246 between the comprehension score on the easy text and the number of images reported for the easy text was significant at the $p < .05$ level. Table 14 shows the Z-transformation scores and the significance level of these scores.

TABLE 14

Z-Transformations Between Comprehension and the Three Dependent Variables and the Significance Level of these Transformations

N = 90		Number of Images	Text Dependency	Completeness
Easy Text	Z	2.344	.953	-.084
	p	.019*	.340	.933
Difficult Text	Z	1.920	1.622	.575
	p	.055	.105	.566

* $p < .05$

CHAPTER IV

Summary, Discussion, Limitations and Implications

This study investigated the ways in which good readers, difference-poor readers and deficit-poor readers at the fourth grade level differ in their use of imagery while reading. Thirty good readers, thirty difference-poor readers and thirty deficit-poor readers were selected on the basis of Stanford Diagnostic Reading Test scores from a total of 236 fourth grade students who formed the subject pool. There were equal numbers of boys and girls in each reader group, and the subjects were matched on SES using parental occupation as an index of SES.

These 90 subjects performed the following task: Each subject read two passages, one at the third grade level and one at the fourth grade level. The subjects were instructed to stop at the end of each sentence. If the sentence gave them a picture in their mind they were asked to describe it. If the sentence did not give them a picture, they were instructed to say "no" and to continue reading. Each subject also answered five comprehension questions about each of the two passages. The subjects' responses were then analyzed in terms of three variables: (1) number of images reported for each passage, (2) text dependency of the images reported, and (3) completeness of the images reported. The results of this analysis showed that there were significant differences between good readers and difference-poor readers and between good readers and deficit-poor readers for number

of images reported and for the text dependency of the images reported. The differences between difference-poor and deficit-poor readers were not significant for any of the variables, and there were no significant differences among any of the reader groups for completeness of the images reported.

Discussion of the Results

To aid in interpreting the findings several other aspects of this study will be discussed first. These include: the results of the analysis of the comprehension scores, the finding of no significant differences between difference-poor and deficit-poor readers for any of the variables, the finding of no significant differences between easy and difficult text among any of the reader groups for any of the dependent variables and the implications of matching the 90 subjects on sex and SES.

The primary purpose of the comprehension questions at the end of each passage was to discover whether or not the subjects had at least a general understanding of the two passages. As Table 11 shows the mean comprehension score for each reader group for each level of material was at least four correct out of the five questions. This indicates that as a group the subjects appeared to have an adequate understanding of the two passages. However, it should be noted as Table 12 shows, there were significant differences between reader groups on the comprehension scores particularly between the good readers and the deficit-poor readers.

The hypotheses for this study, which stated that difference-poor and deficit-poor readers would differ in the way they used imagery were based on the results of a study reported by Levin (1973) which showed that these two groups of readers responded differently when given instructions to image. In Levin's study the performance of the difference-poor readers was improved by such instructions, but the performance of the deficit-poor readers was not. Levin explained this difference by suggesting that the superior word attack skills of the difference-poor readers enabled them to take advantage of the imagery instructions but the deficit-poor readers were inhibited because of their poor word knowledge. However, Levin did not directly compare the performances of the difference-poor with the deficit-poor readers in either the treatment group or the control group, nor did he investigate imaging behaviors when no instructions to image were given. Therefore, it is not clear if the differences in performance were totally due to the ability to respond to imagery instructions or if there was a difference in the way the two reader groups used imagery prior to or without instruction.

The results of this study suggest that the imaging behaviors of difference-poor and deficit-poor readers are similar when no instructions are given. They clearly support Levin's conclusion that differences in performance between the difference-poor and deficit-poor readers were due to the superior word attack skills of the difference-poor readers enabling them to better respond to the instructions.

The results of no significant differences between the imaging behaviors of difference-poor and deficit-poor readers imply that both groups can be combined into one category of poor readers with regard to imaging behavior.

The finding of no significant differences between the easy and the difficult material for any of the three reader groups on any of the dependent variables is an important finding for two related reasons. First it indicates that the subjects in the three reader groups used imagery in the same way even if the difficulty level of the material varied. This finding supports attributing any differences found between the imaging behaviors of good and poor readers to their reading ability rather than to their responses to the difficulty level of the material. Second, the easy and the difficult passages had different content. Again, the finding of no significant differences between passages supports attributing any differences found to the reading ability of the reader rather than to the reader's response to the content.

The high level of correct responses on the comprehension questions indicates that the subjects understood what they were reading, at least at a literal level. The result of no significant differences between difference-poor and deficit-poor readers on any of the dependent variables indicates that these two reader groups can be considered as one group of poor readers for this study. The finding of no significant differences between the subjects' performance on easy and

difficult material among any of the reader groups for any of the dependent variables, combined with the matching of the subjects on sex and SES, supports associating any differences found with differences in the reading ability of the subjects rather than with the level of the material, the content of the material or the experimental backgrounds of the subjects.

The finding that good readers reported significantly more images than either the difference-poor or the deficit-poor readers is based on an objective count of the number of images reported by each subject. The conclusion is straightforward: good readers image more than poor readers. This finding provides some insight into the results reported by Levin (1973) which showed that instructions to image did not improve the performance of good readers. Based on the present findings, it appears that good readers spontaneously use imagery while reading. Therefore it is not surprising that instructions to use a strategy that the good readers were already using on their own would have little effect. Lesgold et al. (1975) and Pressley (1976) trained good and average readers to use imagery. Though significant results in favor of the imagery training were reported for both studies, Pressley (1977) later indicated that none of the demonstrated effects was very large. If, as the present study indicates, the good readers in these studies were spontaneously using imagery, it is also not surprising that the effects of training in the use of imagery would be reduced.

The finding that the good readers had significantly higher text dependency scores than either the difference-poor or the deficit-poor readers is based on the analysis of the investigator's ratings, which were shown to be consistent when compared with the ratings of a second judge. This finding indicates that the images reported by the good readers more closely reflected what was actually read than the images reported by the poor readers. The method of analyzing text dependency used for the present study was designed to give an overall assessment of that variable. However, inspection of the verbal protocols indicates that more specific analysis could provide additional information about reading and imaging. For example, specifically how do good and poor readers differ in the text dependency of the images reported and what can this difference tell us about the comprehension of good and poor readers? For example, inspection of the good and poor readers' protocols shows a tendency for good readers to sometimes report an image that is not text dependent when they are making a guess about why a particular event is happening. However, if the next sentence provides the reason for the event, the good readers usually correct their guess and report a text dependent image for the next sentence. For example for the sentence that read:

> "You look like you could use a swim right now," I said.

One good reader reported the following image:

> "A boy wearing a swim suit, because the other boy said he could be ready to swim now."

The image of a boy wearing a swim suit was not text dependent because

no mention of a swim suit was given in the sentence. This image represented the reader's trying to understand why the boy looked like he could use a swim. The next sentence read:

"To wash some of that mud off you."

The image the good reader reported for this sentence was:

"Oh! He was wearing mud."

This particular reader was able to make a correction in the image reported based on new information provided by the next sentence.

This behavior on the part of good readers provides some evidence that readers can use verbal and imaginal codes separately and together in a very flexible and dynamic way. This type of behavior demonstrates that Pavio's dual-coding theory is applicable to the reading process.

Poor readers, however, did not appear to deal with imaging while reading in this flexible way. There was a tendency on the part of poor readers to report no image for a sentence that did not reinforce their previous image or to report another non-text dependent image. Instead of changing the image to fit the sentence, poor readers seemed to either reject the information in the sentence or to adjust the information to fit a previous image.

The significance of the difference between good and poor readers for text dependency indicates not only that the two reader groups differ on this variable but it also provides direction for further investigation.

The finding that there were no significant differences among any of the three reader groups for completeness of the images reported is

also based on the analysis of the investigator's ratings which were shown to be consistent when compared with the ratings of a second judge. There are two possible explanations for this finding. First it is possible that the subjects left out or could not adequately verbalize all details or aspects of the mental pictures they had. Though it would have been possible to probe the subjects for more detail this would not have been consistent with the verbal protocol analysis technique. It would be possible to further investigate the completeness variable by probing the subjects for more detail as they reported their mental images. The second possibility is that good and poor readers really do not differ in the completeness of the images they have when they read. Perhaps completeness is not a variable that can be associated with mental images.

Limitations

A number of limitations must be kept in mind when interpreting the results of this study. The first limitation concerns the scoring of text dependency and completeness. The scoring of these two variables involved making a judgment based on a general impression of the text dependency and the completeness of the reported images. Though these scores do give a general impression of some of the qualitative differences in the images reported by the good and poor readers, the interpretation of the scores must be done with caution due to the lack of a systematic scoring procedure. In addition, the scoring procedure did not take into account the differences between

simple, compound and complex sentences. All sentences, even the compound ones, were scored as one sentence.

A second limitation of this study was the use of self-report, in the form of verbal protocols, to collect data on the imaging behaviors of good and poor readers. Though this technique has been shown to be a useful research tool (Newell & Simon, 1971) and (Olshavsky, 1976) the subjective nature of the technique must be noted.

Two other limitations of this study concern randomization and generalizability. Though an attempt was made to randomly select all 90 subjects this was not possible with the difference-poor and deficit-poor girl readers because of the small number of subjects in these groups in the subject pool. All the girl difference-poor readers except one and all the girl deficit-poor readers in the subject pool performed the experimental task. The second limitation concerns the selection of classroom units. It was not possible to select classes randomly from the entire population of fourth grade classes in the three school districts. Because of this limitation, caution should be used when generalizing the results of the present study beyond the sample population.

Implications

The findings and the methodology of this study have a number of implications for further research. The specific findings indicate several areas for further research. The methodological problems of this study give some indication of how future researchers might proceed differently.

The result of significant differences between good and poor readers for text dependency supports further investigation of how good and poor readers differ on this variable. One possibility for such investigation was described in the discussion section of this chapter. A related topic would be to investigate how readers use images to help them sequence the events in a passage. The verbal protocols of the good readers showed that this reader group had a tendency to build from one image to the next so that their self-reported images reflected the entire sequence of the passage. The passages used in this study were narrative; another possibility for further research would be to investigate whether or not the imaging behaviors of readers differ between narrative and expository material. Finally, fourth graders were selected for the present study; further investigation of the findings with grade levels other than fourth is indicated to determine if imaging while reading is developmental in nature.

Following further confirming evidence, there are instructional implications for the results of this study. If further research can show how good and poor readers differ in the text dependency of the images reported, poor readers might be instructed in how to image.

Inspection of the verbal protocols about the images the subjects in this study had when they read shows that this technique (verbal report of mental images) could have value for diagnostic purposes. The images reported by the poor readers in this study frequently show how the reader misinterpreted what was read. (See number 48 in

Appendix C for an example of a protocol of a poor reader.) Given this type of information it would be possible to determine where and how the reader became confused.

Methodological Implications for Future Research. The results and the methods used in the present study have a number of implications for future research.

The problem posed for this study, how do good and poor readers differ in the way they use imagery while reading, was a difficult one to investigate because it is impossible to investigate a complex mental process without effecting it by the act of investigation. The protocol analysis technique was selected because it appeared to interfere the least with the on-going process. The major problem with this method was that there was no objective way to determine if the subjects were in fact reporting the pictures they had in their minds. The assumption was made that the subjects would report what they were asked to report.

A second methodological problem of this study was the analysis of the verbal protocols. The quantative analysis simply required a count of the images each subject reported. However, the qualitative analysis involved selecting qualitative variables and developing appropriate methods to analyze them. Text dependency and completeness were selected as the two variables to be analyzed for this study because they represented two important aspects of recall about a sentence: the degree to which the recalled material reflected what was actually stated in the sentence and the degree to which the

material recalled contained the information presented in the sentence. However, it is important to note that only two qualitative aspects of the reported mental images were identified and analyzed for this study. Other qualitative dimensions remain to be identified and analyzed. For example, inspection of the verbal protocols showed that some readers reported images that sequenced the events in the passage. It appeared that these readers were using images as a way of organizing the material they had read. The use of images to sequence or organize material that has been read would be a potential qualitative variable for analysis in future investigations of imaging and reading.

A third methodological problem of this study was the scoring of text dependency and completeness. Text dependency and completeness were scored on a scale from one to three based on a general impression of how text dependent and how complete the reported image was. The major reason a systematic procedure for scoring text dependency was not developed was that it appeared that an image and the usefulness of that image was unique to a particular person. As a result, an image might not be strictly text dependent but it could still aid the reader in processing the information in that sentence. For example for the sentence in the first passage that read:

> "But I'm glad I have some time to decide what kind." (Kind of airplane he or she wants to fly.)

One good reader reported the following image:

> "I see a boy paging though a book with all kinds of pictures of airplanes. He's

trying to decide what kind he wants to
fly when he grows up."

The image of a boy paging through a book trying to decide what kind of airplane he wants to fly when he grows up is a reasonable one to have for the particular sentence that was read. Yet strictly speaking, it was not text dependent because a boy paging through a book was not mentioned in the original sentence. For this reason text dependency was scored on the basis of a general impression in order to take into account the unique and flexible ways that readers use imagery. One possible way of systematizing the scoring of text dependency would be to rate this variable using a larger scale and to include a number of dimensions in this scale such as whether or not the reported image is reasonable given a particular sentence.

The scoring of completeness was also based on a general impression. However, the scoring of this variable could be systematized for future investigations by comparing the number of propositions in the original sentence with the number of propositions in the reported image.

A final methodological implication for future research concerns the relationship between imaging and comprehension. The results of this study showed that the correlation between the comprehension scores on the first passage and the number of images reported for that passage was significant at the $p < .05$ level. The correlation between the comprehension score on the second passage and the number of images reported for that passage was significant at the $p = .055$ level. In addition there were significant differences among the

comprehension scores of the three reader groups. Though these differences in comprehension scores did not exactly parallel the differences in the number of images reported among the three reader groups, there was some correspondence. There were significant differences between the good readers and the deficit-poor readers on the comprehension scores for both the easy and the difficult text and significant differences between the good readers and the deficit-poor readers for number of images reported for both the easy and the difficult text. These results suggest a relationship between imaging while reading and reading comprehension. Future investigations with several modifications of the methods used in this study might clarify this relationship. For example the comprehension questions used in this study measured comprehension only at a literal level. In order to better understand the relationship between imaging and reading comprehension, it would be important to also measure comprehension at an inferential level. In addition, only five questions were asked about each passage in this study. A final suggestion for future research would be to develop more questions to improve the reliability of the comprehension measure.

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Appendix A

Practice Passage
Third Grade Level Passage
and
Fourth Grade Level Passage

PRACTICE

Peter and Penny were delighted with the cabin where their family was spending the weekend. There was a huge fireplace. And there were bunk beds. The boys were as hungry as bears and gobbled up the potato soup, chicken sandwiches, and hot cocoa their mother fixed for supper. They wanted to try out the bunk beds so they went to bed right after supper.

If I Flew a Plane

When I grow up I'm going to fly a plane. But I'm glad I have some time to decide what kind. If I flew a passenger plane, I'd take my whole class for a ride. My friend Ernest would be my copilot. Linda could be the stewardess. "Fasten your safety belts, please," Linda would say. Then I'd start up the engines. Brrummm, brrummm, brrummm. I'd wait for clearance from the control tower and taxi down the runway. Then the engines would begin to roar. BRRUMM BRRUMMM and off we'd go--up, up, up into the sky, high over the clouds. We'd look down, and the clouds would be all white and fluffy--like mashed potatoes. If I flew a cargo plane, I'd fly to India and bring back two baby elephants for the circus. I'd fly them over the ocean and circle around until I saw the tents. Then I'd land on the circus grounds and let down the ramp. The elephants would smell the popcorn and peanuts, and they'd lift their trunks and squeal.

Muskrat Wallow

Albert and I were in a good mood as we walked home from school. The weather was so nice we'd taken a detour around by Muskrat Wallow - the most beautiful place in Glenwood. There were woods in Muskrat Wallow, oaks and cedars with a good smell and sticky pines - and squirrels, rabbits, birds, and sometimes even deer. There were all kinds of pretty flowers too, especially in spring, and close to the creek some deep green moss grew that was as soft to walk on as expensive carpet.

"Boy, Trudy, the creek sure looks good today," Albert said. "Soon it'll be warm enough for swimming again."

I looked at him and laughed. "You look like you could use a swim right now," I said. "To wash some of that mud off you."

Albert looked down at his school clothes, which were a mess, as usual. If there was a tree, Albert had to climb it; if there was a hill, Albert had to roll down it; and if there was a mud puddle, Albert had to fall in it.

Mrs. Merriweather was waiting for us. When she saw Albert, her eyes and mouth opened wide. "Where have you been?" she demanded.

"Playing in Muskrat Wallow," I said.

Appendix B

Comprehension Questions

Questions

1. What did the person telling the story want to do when he or she grew up?
   a. Build a house
   b. Become a fireman
   c. Fly a plane
   d. Drive a truck

2. What did the person telling the story have to wait for before taxiing down the runway?
   a. The person had to wait for clearance from the control tower.
   b. The person had to wait for the engines to warm up.
   c. The person had to wait for all the passengers to get on.
   d. The person had to wait for the snow to stop.

3. What did the person telling the story say the clouds looked like?
   a. White cotton
   b. A snowy field
   c. Mashed potatoes
   d. Whipped cream

4. What did the person telling the story say he or she would bring back from India?

   a. A tiger

   b. A large elephant

   c. Two baby elephants

   d. A snake

5. Why would the elephants lift their trunks and squeal?

   a. They were glad to get off the plane.

   b. Elephants always do that.

   c. They smelled the popcorn and peanuts at the circus.

   d. They were angry.

Questions

1. Who is walking home from school in the story?
    a. Albert
    b. Trudy and her mother
    c. Trudy
    d. Albert and Trudy

2. What kind of mood were Trudy and Albert in when they walked home from school?
    a. A sad mood
    b. A bad mood
    c. A good mood
    d. An angry mood

3. Muskrat Wallow was:
    a. An ugly swamp
    b. A place where nothing could live
    c. A beautiful place
    d. A scarcy place

4. Albert said it would soon be warm enough to:
    a. Go fishing
    b. Go swimming
    c. Hunt for frogs
    d. Throw stones in the creek

5. Albert's clothes were:

   a. New

   b. A mess

   c. Torn

   d. Very old

Appendix C

Scoring of Verbal Protocols

Subject # 8

T.D. = Text dependency
3 = high degree of text dependent
2 = partial text dependency
1 = low degree of text dependency

C. = Completeness
3 = complete
2 = partial information
1 = not complete

If I Flew a Plane

Sentence Read:		Judge One	Judge Two
1. When I grow up I'm going to fly a plane.	T.D.	3	3
Verbal Protocol:	C.	3	3
I see a little boy at an airport saying that when he grows up he's going to fly a plane.			
2. But I'm glad I have some time to decide what kind.	T.D.	3	2
I see a boy with all these airplanes, deciding which one he's going to pick to fly.	C.	3	3
3. If I flew a passenger plane, I'd take my whole class for a ride.	T.D.	3	2
I see him riding in an airplane with his classmates	C.	2	1
4. My friend Ernest would be my copilot.	T.D.	3	2
I see Ernest sitting in a chair beside him in the cabin in the front of the plane.	C.	3	2
5. Linda could be the stewardess.	T.D.	3	2
I see a lady as a stewardess.	C.	2	2
6. "Fasten your safety belts, please," Linda would say.	T.D.	3	2
I see Linda by the mike talking and	C.	3	3

saying, "Please fasten your seat belts.

7. Then I'd start up the engines. Brrummm, brrummm, brrummm. T.D. 2 2
C. 2 2

I see the plane starting up.

8. I'd wait for clearance from the control tower and taxi down the runway. T.D. 3 3
C. 3 3

I see him talking on the microphone, getting clearance for taking off on the runway and then taking off.

9. Then the engines would begin to roar. T.D. _____
C. _____

10. BRRUMM BRRUMMM and off we'd go--up, up, up into T.D. 3 3

I see him real high above the clouds. C. 2 2

11. We'd look down and the clouds would be all white and fluffy--like mashed potatoes. T.D. 3 3
C. 3 3

I see him and the other guys looking down at the clouds. They look like mashed potatoes.

12. If I flew a cargo plane, I'd fly to India and bring back two baby elephants for the circus. T.D. 3 3
C. 2 2

I see him flying back from India and bringing back two baby elephants in a cage.

13. I'd fly them over the ocean and circle around until I saw the tents. T.D. 3 3
C. 2 2

I see him flying the elephants over the ocean till he sees some tents.

14. Then I'd land on the circus grounds and let them down the ramp. T.D. 2 2
C. 2 2

I see an elephant coming out of a cage and into the circus.

15. The elephants would smell the popcorn and peanuts, and they'd lift their trunks and squeal. T.D. 3 3 C. 2 2

I see them lifting their trunks and making funny noises.

Total # of images 14 T.D. score 2.857 C. Score 2.429

Muskrat Wallow

1. Albert and I were in a good mood as we walked home from school. T.D. 2 2 C. 3 3

I see two kids walking home from school and telling jokes.

2. The weather was so nice we'd taken a detour around by Muskrat Wallow--the most beautiful place in Greenwood. T.D. 1 1 C. 1 1

I see them walking around a place that's maybe a fort.

3. There were woods in Muskrat Wallow, oaks and cedars with a good smell and sticky pines--and squirrels, rabbits, birds and sometimes even deer. T.D. 3 3 C. 2 2

I see them walking through a woods and seeing all sorts of animals and different kinds of trees.

4. There were all kinds of pretty flowers too, especially in spring, and close to the creek some deep green moss grew that was as soft to walk on as expensive carpet. T.D. 2 2 C. 2 2

I see them picking flowers and seeing all sorts of pretty kinds and I see them walking on some moss that feels like expensive carpet.

5. "Boy, Trudy, the creek sure looks good today," Albert said. T.D. 3 3 C. 3 3

I see Albert talking to hsi friend saying, "Boy, the creek looks good."

6. "Soon it'll be warm enough for swimming again." T.D. 3 3

I see Albert saying "Boy, soon it'll be warm enough for swimming again." C. 3 3

7. I looked at him and laughed. T.D. 3 3

I see Trudy laughing at Albert. C. 3 3

8. "You look like you could use a swim right now," I said. T.D. 3 3

C. 3 3

I see Trudy saying to Albert, "Boy, you look like you could use a swim right now."

9. "To wash some of that mud off you." T.D. 3 3

I see Trudy looking at Albert and saying he's got mud on him. He should take a swim to get the mud off. C. 3 3

10. Albert looked down at his school clothes, which were a mess, as usual. T.D. 3 3

C. 3 3

I see Albert looking at his school clothes, seeing that they're all dirty they usually are.

11. If there was a tree, Albert had to climb it; if there was a hill, Albert had to roll down it; and if there was a mud puddle, Albert had to fall in it. T.D. 3 2

C. 1 1

I picture Albert getting his clothes dirty from falling into a mud puddle.

12. Mrs. Merriweather was waiting for us. T.D. 3 3

I see a lady waiting for the two boys. C. 3 3

13. When she saw Albert, her eyes and mouth opened wide. T.D. 3 3

I see a lady seeing Albert with his clothes so dirty. With her mouth open. C. 2 2

14. "Where have you been?" she demanded. T.D. 3 3

I see a lady asking them angrily where they've been. C. 3 3

15. "Playing in Muskrat Wallow," I said.

Total # of images 14 T.D. score 2.857 C. Score 2.500

Subject # 48

T.D. = Text dependency
3 = high degree of text dependency
2 = partial text dependency
1 = low degree of text dependency

C. = Completeness
3 = complete
2 = partial informat information
1 = not complete

If I Flew a Plane

Sentence Read:		Judge One	Judge Two
1. When I grow up I'm going to fly a plane. Verbal Protocol:	T.D.		
	C.		
2. But I'm glad I have some time to decide what kind.	T.D.	3	2
I see somebody trying to decide.	C.	2	1
3. If I flew a passenger plane, I'd take my whole class for a ride.	T.D.		
	C.		
4. My friend Ernest would be my copilot	T.D.	1	1
I see this boy trying to drive a plane.	C.	1	1
5. Linda could be the stewardess.	T.D.	2	2
I see a girl being a stewardess and giving coffee out and stuff.	C.	1	1
6. "Fasten your safety belts, please," Linda would say.	T.D.		
	C.		
7. Then I'd start up the engines. Brrummm, brummm, brrummm.	T.D.	2	2
	C.	2	2
When the engine starts the propeller goes around.			

8. I'd wait for clearance from the control tower and taxi down the runway. T.D._____ C._____

9. Then the engines would begin to roar. T.D._____ C._____

10. BRRUMMM, BRRUMMM and off we'd go--up, up, up into the sky high over the clouds. T.D. 2 2 C. 1 1

    How they're going to go up.

11. We'd look down and the clouds would be all white and fluffy--like mashed potatoes. T.D. 1 1 C. 1 1

    Like somebody thinking of mashed potatoes and eating them.

12. If I flew a cargo plane, I'd fly to India and bring back two baby elephants for the circus. T.D._____ C._____

13. I'd fly them over the ocean and circle around until I saw the tents. T.D. 1 1 C. 1 1

    When people are camping they have tents.

14. Then I'd land on the circus grounds and let them down the ramp. T.D._____ C._____

15. The elephants would smell the popcorn and peanuts, and they'd lift their trunks and squeal. T.D._____ C._____

Total # of images 7 T.D. Score 1.571 C. Score 1.143

Muskrat Wallow

1. Albert and I were in a good mood as we walked home from school. T.D. 1 2 C. 1 2

    I see a boy who was walking home in a good mood.

2. The weather was so nice we'd taken a detour around by Muskrat Wallow - the most beautiful place in Glenwood. T.D._____ C._____

3. There were woods in Muskrat Wallow, oaks and cedars with a good smell and sticky pines - and squirrels, rabbits, birds and sometimes even deer. T.D. 1 1 C. 1 1

   I see a whole bunch of animals playing around and having fun.

4. There were all kinds of pretty flowers too, especially in spring, and close to the creek some deep green moss grew that was as soft to walk on as expensive carpet. T.D. 2 2 C. 1 1

   There's a whole bunch of flowers like a flower bed.

5. "Boy, Trudy, the creek sure looks good today," Albert said. T.D._____ C._____

6. "Soon it'll be warm enough for swimming again." T.D. 1 1

   I see the two boys swimming. C. 1 1

7. I looked at him and laughed. T.D._____ C._____

8. "You look like you could use a swim right now," I said. T.D. 2 2 C. 1 1

   Like they were ready to go into the lake and go for a swim.

9. "To wash some of that mud off you." T.D. 2 2

   To get the mud off. C. 2 2

10. Albert looked down at his school clothes, which were a mess, as usual. T.D. 2 2 C. 2 2

    I see the boy who has all kinds of mud on his shirt and jacket.

11. If there was a tree, Albert had to climb it; if there was a hill, Albert had to roll down it; and if there was a mud puddle, Albert had to fall in it. T.D. 1 1 C. 1 1

I see him climbing up a tree and rolling down a hill and doing some other things.

12. Mrs. Merriweather was waiting for us. T.D._____ C._____

13. When she saw Albert, her eyes and mouth opened wide. T.D. 2 2 C. 2 2

She was surprised that Albert was all muddy and stuff.

14. "Where have you been?" she demanded. T.D. 1 1 C. 1 1

She was getting red. She really got mad.

15. "Playing in Muskrat Wallow," I said. T.D._____ C._____

Total # of images 10 T.D. Score 1.500 C. Score 1.300